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IN FOUR SECTIONS

Section I

IN THIS ISSUE

Establishing Control of Factory Overhead,
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EDITORIAL DEPARTMENT NOTE

More and more accountants and other industrial executives are coming to the realization that the relaxation of cost control in the interest of all-out production for the war was carried too far and that cost control is a necessary adjunct of efficient and expeditious production. Excess costs represent waste of manpower and materials and, in most cases, tend to slow up rather than speed up the production process. The consideration being given and to be given to low-cost production in renegotiation and contract termination settlements and anticipation of the competitive situation after the war have helped to accelerate the trend toward reinstating cost control techniques or their development where they have not formerly existed. The article in this issue of the *Bulletin* is a case study presentation of the activities of one company in this field.

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AUGUST 15, 1943

ESTABLISHING CONTROL OF FACTORY OVERHEAD

By Robert W. Herr, In Charge of Cost Control,
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WHEN the plant manager insists that production comes first and that costs are unimportant, the controller's position today is delicate, to say the least. Yet it requires only moderate self-control to point out that expense and waste go hand in hand. High tool costs are a good indication of improper use or excess breakage, which is a waste of precious high-speed steel. Repair costs resulting from careless handling of machines are a loss of labor and materials which can be reduced by careful supervision. Also indirect labor often includes an element of wasted manpower which can be eliminated by improving methods and procedures.

Overhead expenses constitute a major element of cost where extravagance and waste can flourish. Production engineers stress the importance of labor incentives and time and motion studies to secure operating efficiency. With these techniques they teach us how to get the most out of the direct labor dollar, which is an important saving. But overhead expenses are even more important than direct labor. The dollar amount of overhead is greater than that of labor in most cases, often more than a third of total manufacturing cost, and the loose ends are looser. No set procedures can readily be devised to govern the use of operating supplies or the requirements for indirect labor in manufacturing operations, and waste is hard to pin down by engineering methods. Control accounting, however, will put the screws on by placing the responsibility for each expenditure on a single individual.

Comprehensive Program Decided Upon

With these things in mind, we recently installed a program for control of overhead expenses. Because a rapid growth in business made other changes desirable, it was decided that the program should be comprehensive, to include revision of methods from shop reporting at the source to final tabulation and recording in the expense ledger. A case study is presented, therefore, which may be useful to any manufacturing business contemplating installation or revision of control procedures.

The business in this case is the manufacture of heavy tractor-drawn machinery and equipment, including earthmoving scrapers, bulldozers, rollers, ground-breaking rooters and related equipment. Products are fabricated chiefly from raw steel, and operations included broadly: cutting and shaping, machining, heat treating, welding assembly, cleaning and painting, and line assembly. Wire rope and welding electrodes are manufactured as separate operations. Employees in the plant under consideration number about 2,500, and related sales (for this plant only) are approximately $18,000,000 a year.

Presentation will be divided into three general headings: Purpose and scope of program; mechanics; and results achieved.

Purpose and Scope of Program

Control of factory overhead is a vague concept unless it is tied down to more specific aims. The precise aims will, in fact, largely determine the outline and working details of any cost program.

Establishing Responsibility

In this case the first objective was to establish a clear-cut responsibility for all expenditures entering into factory overhead. The natural accounting breakdown of expenses by kind of cost, such as indirect labor, operating supplies, repairs, etc., serves only to explain, and no responsibilities can be attached except as these expenses are further divided between the operating departments. We found that the business had grown to a point where each of the existing departments was a small business in itself, and the items included in any one expense account were too varied to permit even the department supervisor to put his finger on them with any assurance. Smaller departments were indicated, reaching farther down the line of supervision to secure a responsibility for which each man could be held accountable.

Making Foremen Cost Conscious

A second objective, equally as important as the first, was to make the operating foremen cost conscious. Too often perhaps the foreman is selected chiefly for his knowledge of machines and methods and his ability to "get the work out." Not enough consideration is given to other requirements for good management

which include a thorough knowledge of operating costs. Furthermore, the constant pressure for increased production is an invitation, if not an excuse, for ignoring costs. The tendency to waste manpower and materials necessarily increases, and machines are pushed until finally a breakdown proves that even in a machine shop "a stitch in time saves nine." Rejects will tend to increase, with more scrap and a higher rate of reoperation time penalizing production. And as parts are rejected a shortage down the line necessitates more frequent job changes on machines and increased set-up time, further reducing output. The foreman on the production job is in the best position to see these things and to correct them. Translated for him into dollars and cents through cost information, he has the incentive to improve his operations, reduce waste and increase operating efficiency.

Budgetary Control

As an instrument for control, to measure performance and provide a basis for comparison, budgets were planned. A budget for each department would establish the normal or expected cost for comparison with actual to show the department head where his expenses were out of line. A summary statement of actual versus budgeted expenses would show management at a glance which cost elements needed attention, and the detail by department would locate the trouble. Thus, supervisory control through variations from budget, or "management by exception," was a third objective. Since expenses would fluctuate with changes in output, it was decided to use a variable budget which would increase or decrease with the level of production. Budgets would be based on experience and must necessarily be delayed until expense history had been secured for the new departments. The history would then be reviewed with the department head to work out a budget consistent with his own ideas of what could be accomplished, to establish a goal that he was ready to work for.

Improving Costs

A natural corollary to control objectives was to improve cost procedures. Some benefits were obvious. For example, the smaller departments necessary to secure adequate control informa-

tion would serve also as smaller cost centers for application of factory overhead to products. Overhead directly chargeable to the operating departments would be more finely divided, and direct labor collected by the smaller centers would permit a more accurate distribution of general overhead on the basis of direct labor. Again, it was necessary for control purposes to provide a more accurate determination of expenses properly chargeable to each month's operations. Certain supply items formerly expensed at the time of purchase must now be charged off when consumed, on the basis of requisitions. These requisitions would provide a detail of supply costs directly chargeable to each department, which had not previously been available. The net effect must be to secure a burden rate more closely related to each particular operation in the plant, which was particularly desirable because of the varied nature of the operations required to manufacture different products.

Thus, the main objectives were:

(1) To establish responsibility for expenditures;
(2) To make the operating foremen cost conscious;
(3) To set up budgetary control;
(4) To take advantage of control information for better cost.

The program was designed to cover all manufacturing operations in the plant described above. Thus all producing departments and all staff or service departments were to be brought under control, and the costs involved were all the controllable expenditures entering into factory overhead, including overhead directly chargeable to producing departments and representing the operating costs of staff departments.

Mechanics

Control Centers

The first step in setting up control procedures was to establish the control units or departments. The plant was mapped out in detail and analyzed by (1) functional lines, and (2) supervision lines. It was desirable, of course, that the two coincide. For cost determination a functional breakdown would be best, since

overhead rates will vary chiefly with the nature of operations. Thus, the supply costs in a shearing operation would consist of only occasional changes of blades and would be small in relation to the rapid consumption of expensive drills in a drilling operation. But for control purposes it was essential that department lines be strictly drawn according to supervision, since any division of responsibility would immediately invite "passing the buck" on troublesome cost figures.

Cases where functional lines were not consistent with supervision were discussed with the plant management with a view to changing supervision to conform if at all possible. In some cases this was done. In fact, the analysis brought to light some instances where changes in lines of supervision would improve operating procedures and lead to more effective management. When supervision could not be conformed to functional lines, the decision was to let supervision determine the department boundaries.

Foremen Made Responsible

The plant foreman was selected as the individual to be held responsible for cost. Not only would cost figures bring to his attention the bad spots in his department, but a running record of operating costs would provide him with the tools for good management as well as a measure of his accomplishments. Accordingly, new departments were created to coincide with the supervision of each production foreman and of each foreman or supervisor responsible for a staff function. Each department was to cover operations of both day and night shifts. In order to secure a single department head, the list of foremen on each shift was reviewed and the department head selected. He was then automatically placed on the day shift and made responsible for operations on all shifts.

The result was a list of 66 departments, consisting of 40 production and 26 staff departments. Numbers were assigned to the new departments which could be used in all reporting from the shop to indicate the department to be charged for labor or supplies.

Expense Accounts

The second step was to revise the list of expense accounts to yield a breakdown more suitable for control.

Certain expenses such as depreciation, insurance, taxes, etc., are not subject to control. Others are controllable by top supervision but not by the foremen, such as pay allowances for lunch period, building rent, etc. In this case it was intended that the department head or foreman should be held responsible for only those expenses over which he could exercise a measure of control, to avoid any possible dissatisfaction over other costs. This meant eliminating from the control picture not only the expenses which by nature are not controllable, but *any item of expense which was prorated to the various departments.* A good example of this is electricity. It was not considered worth while to install meters in each department, and the alternative was to prorate the expense on a basis such as motor installations. In a period when production is low in one department the cost of electricity would not be reduced in proportion, and the foreman would have a proper objection to the inclusion of this expense in his budget.

Under this control procedure, the requirements of expense accounts for control use were identical with the accounts which would be used to report costs from the shop. In general, the expenses which originated in the shop, either on labor tickets or on supply or repair requisitions, would be those reported back to the foreman. This simplified the problem of educating plant foremen on the meaning of expense accounts, and reduced the selection of control expense accounts to relatively few.

Although the list of overhead expense accounts was completely revised to accommodate the new control breakdown, the list of accounts for use in expense reports to the shop was, in general, limited to the following:

Account No.	*Name*
11	Supervision
12	Clerical labor
13	Indirect production labor
14	General service labor
(15 to 19)	Reserved for special labor elements not subject to control

Account No.	*Name*
30	Operating supplies
31	Tools and jigs
32	Welding rod
33	Acetylene and oxygen
34	Oil and grease
35	Paint
(36 to 39)	Reserved for special supply costs, including gas and electricity, not subject to control.
50	Repairs and maintenance
53	Experimental
59	Miscellaneous

It should be said here that machine set-up and reoperation properly belong in the foregoing list as separate labor elements subject to control if these items are treated as an overhead expense. In this plant the cost of set-up and reoperation are treated as direct labor costs, and adequate controls have been established (and reported to the foreman) outside of the overhead procedure and therefore beyond the scope of this discussion. It may be interesting to note, however, that the department responsible for reoperation or salvage work, as well as scrap, is determined on the basis of reject tags issued by inspectors, rather than from labor tickets. A reject tag clerk interviews the foremen personally to determine the real cause of each rejection (to be noted on the tag). Often the responsibility is far removed from the scene of operations, as when steel cracks during heat treatment because of faulty structure. Not only does this procedure relieve the department foreman of charges for which he is not responsible, but it also provides an immediate check on the cause of rejects for the plant manager.

Where the breakdown of overhead expense accounts does not suffice to give the detail required for management purposes, as for example when information is desired on the cost of grinding tools or repairing one type of machine, special job numbers are used to secure a job cost. These jobs are then closed into the expense accounts where they properly belong.

The new account numbers completed the picture for reporting from the shop. The account number would designate the type of expense, to be followed by a dash and the department number. Thus welding rod to be used in Department 120 would show on the requisition as a charge to 32-120.

Labor Reporting

A new procedure for reporting overhead labor from the shop was necessary to provide information in greater detail than previously available. Weekly job cards were replaced by job cards or labor tickets to be filled out by the men. Separate columns were provided to show the account and department to be charged. Ample space was allowed for a description of the work done. Since no timekeepers are used, the description was particularly important as a guide to the correctness of charges made. In the tabulating procedure provision was made for an auditor to compare the charges with the description on each card and make any necessary corrections.

Time spent on each job to the nearest quarter hour was required to be entered manually by the men, instead of punched on a time clock as with the former weekly job cards. It had been found that on the weekly cards the workers were sometimes inclined to apply a full day's work on a single job to avoid walking to the time clock to punch in and out on a new job. In some cases they forgot to punch in or out at the proper time. Time entered manually, even though based on estimates made at the end of the day, has proved much better than clock time and is considered sufficiently accurate for all practical purposes. The foreman's signature on each card indicated his approval of the charges and time reported.

Although the men fill out their own job cards in all cases, clerks were provided in the maintenance departments to assist the men and determine the charges to be made. This was necessary because maintenance labor is charged to other departments on the basis of requisitions for repair work, and involves careful accounting. In this case the job card column "Department worked in" is interpreted to mean "Department worked for." The clerk's duties include assignment of repair jobs to maintenance crews, as well as verification of time reported on job cards.

The foregoing procedure covers day work paid at hourly rates, which makes up the bulk of the labor in overhead accounts. However, time is also reported in the form of units earned under a labor incentive plan (used primarily for direct labor). These units which apply to overhead expense accounts are converted to labor hours and included in the proper accounts to complete the picture.

Operating Supplies

Accounting for supplies used in the shop required a complete control of all supplies released from stores through a requisitioning procedure. Items which might otherwise be expensed at the time of purchase must now be carried in inventory and charged out as consumed, to insure a proper month-to-month accounting of supply costs in each department.

A new form of supply requisition was adopted. To be accepted at the stores window the requisition must be signed by the department foreman or by someone authorized by him whose name must be on file with the stores department. This established direct accountability.

The space provided for "Job or Account No." is filled in by the foreman, showing the account number followed by a dash and the number of the department to be charged. Stores clerks were thoroughly schooled in the new account series and are responsible for verifying and approving the charges. In effect, they act as auditors at the source.

As with daily job cards, a space was provided for description, to show for what purpose the supplies would be used. This is the basis for a later review of each requisition in the cost department before summarizing, to verify that proper charges have been made.

Tool cribs presented a special problem. Supply items must be released from stores to the cribs against requisitions signed by the tool crib foreman, since tools are issued to the operating departments singly or in quantities too small to warrant a requisition for each item. Due to the fact that requisitions are the basis for charges to expense, there was no record to establish where the supplies were consumed. To cover this point a system of window tickets was installed in the cribs, requiring that a ticket be signed by the receiving worker, showing his department number, whenever a new tool was issued. (Used tools are issued "free.") When

requisitioning new supplies the tool crib clerks attach to the requisition the window tickets collected for corresponding tools issued, and charges on these requisitions are allocated in the cost department in accordance with the tickets. The disadvantage of charging only new tools issued, permitting re-use of tools without charge, is largely offset by the fact that tools of any particular type (especially the expensive items) are generally used in only one or two departments. In effect each department is re-using the tools for which it has already been charged.

Repairs and Maintenance

It was decided that repair work should be accounted for as strictly as operating supplies, and work should be done only against repair requisitions authorized by the foreman. For this purpose a mechanical work order form was designed. The mechanical work order also provides data essential for scheduling repair work and maintaining records of repair costs by machine or other piece of equipment, which records are used by the maintenance departments to assist in planning overhauls and machine replacements.

To secure repair work, a foreman must make out a work order, filling in the information called for in the first section of the form. In the space relating to "Job No." he enters both the account and department number to be charged. Work orders are then forwarded to the maintenance clerk who verifies the charge and arranges for scheduling of the work. The work order itself is delivered to the repair crew when work is assigned, which gives them the proper charge to enter on daily job cards or on stores requisitions for any repair parts. The work order number is entered by maintenance men in the "Order No." column on the job cards. As stated above, the job cards are later reviewed by the clerk who verifies that the charges made agree with the charges on the related work orders.

When a repair job is completed the maintenance crew must secure approval of the foreman in the department where the work was done. The foreman's signature at the bottom of the work order is evidence that he is satisfied with the work and approves the time spent on the job as shown in the space "Man hours required" on the work order.

Summarizing Labor Costs

A substantial increase in the number of departments, the substitution of daily for weekly job cards, and the increased coverage of stores requisitions presented new problems in summarizing cost data, since all overhead labor (including repair labor) would be reported from the shop on daily job cards, and all supply costs (including repair parts) would be reported on stores requisitions.

The procedure established for summarizing labor is as follows: Job cards are received from the shop each day in one lot from each department, covering all shifts. Thus, they are already sorted by departments for convenience in auditing. Each card is then reviewed by an auditor in the tabulating division to assure that charges are consistent with the description of work done. After audit the job cards are delivered to key punch operators who transfer the information to tabulating cards. A separate card is punched for each separate charge appearing on job cards, and the information transferred includes date, man number, home department number, hours worked, and account and department charged.

From the tabulating cards a weekly report is prepared on the tabulating machine showing the hours charged to each account in each department, as well as the department where the charges originated. In the cost department the hours on this report are valued at average rates of pay for preceding periods in the department where the work originated. Because overtime is a regular policy and results in fluctuating rates per man, the average rate is considered preferable for cost purposes to the actual pay on a particular job. (Payroll data are prepared from separate records, and cost figures balanced to payroll by department through a variance account.) Although this cost procedure results in delaying the effect of heavy overtime on overhead costs in a particular department, since the higher rates of pay for overtime will not be reflected in figures for the current month, this is not serious because an independent control is maintained on overtime hours. For control purposes other than overtime the average rate yields a better figure, since it tends to measure hours of work rather than rate of pay and is therefore more useful to the foreman in comparing his performance from month to month.

After valuation of hours the charges are posted each week to a summary record book with a separate page for each department, to be transferred at the end of the month to the expense ledger.

Consideration has been given to the possibility of preparing reports from the tabulating machine to cover an entire month. This would require valuation of hours and posting to the summary record only once a month instead of weekly. However the weekly handling is not burdensome and has distinct advantages. Labor costs can be reviewed weekly, unusual trends spotted, and sometimes serious errors corrected before they have gone too far. Furthermore, when control reports have been issued to the shop and the telephone begins to ring with queries on various items, the weekly breakdown is extremely valuable in tracing events as they occurred.

Summarizing Supply Costs

The procedure for summarizing supply requisitions is as follows:

After delivery has been made and quantities noted in the "Delivered" column on stores requisitions, the price of each item is entered in the "Unit price" column from records maintained on the inventory cards in stores department files. This is done by stores clerks when posting to the inventory cards. Requisitions are then forwarded to the cost department where the account charge on each requisition is reviewed, and extensions are made of unit price times quantity delivered to secure a total amount for each requisition.

Periodically during the month requisitions are sorted manually by department and by accounts charged. At the end of the month the requisitions for each account in each department are simply added on a tape and the results posted to a summary record book with a page for each department. Requisitions for the month are then filed by department, stapled together by accounts, and reference is easily made for analysis of the charges to any account.

Departmental Expense Ledger

As a final summary record of expenses by the new control departments, a subsidiary departmental expense ledger was set up

under the control account "Manufacturing Expense." The summary records of overhead labor and supply costs maintained by the cost department, as outlined above, are totaled each month and control account totals entered in the general journal. The detail by account and department is then posted to the departmental expense ledger.

The expense ledger also receives all charges to manufacturing expense from other sources, including the voucher register, the monthly payroll journal (covering employees on monthly salary who do not report their time on daily job cards), and other special journals. In some cases, such as the salary of a department head on the monthly payroll, the entry is made to one of the expense accounts used for control (here Account 11—Supervision) where it properly belongs to complete the picture of controllable expenses. In most cases, however, the entries from these other sources are to expense accounts outside of the series used for control purposes, such as depreciation, traveling expenses, insurance, etc.

Thus when entries are completed, the departmental expense ledger yields the totals of each account used for control, as well as the total of all manufacturing expenses (controllable and noncontrollable) distributed by department. A general factory department is charged for those expenses which cannot be charged directly to other departments.

Monthly reports of expenses by department are prepared from the expense ledger. From these are prepared the control reports to be issued to department foremen, by taking off the totals of only those accounts which are used for control. The expense ledger reports are also used in total by the cost department for distribution of overhead to manufacturing operations.

Reports to Foremen

A simple form of performance report was adopted for reporting to the shop (Exhibit 1). Although budget figures are not yet available, the procedure is as follows:

EXHIBIT 1

PERFORMANCE REPORT

Dept.

Period Ending

To:

% Capacity: Month

Year to date

ACCOUNT	CURRENT MONTH			YEAR TO DATE.		
	Actual	*Budget*	% *(Over) Under*	*Actual*	*Budget*	% *(Over) Under*
11 Supervision						
12 Clerical						
13 Indirect Prod. Labor						
14 Gen. Service Labor						
30 Operating Supplies						
31 Tools & Jigs						
32 Welding Rod						
33 Acetylene & Oxygen						
34 Oil & Grease						
35 Paint						
50 Repairs & Maint.						
53 Experimental						
59 Miscellaneous						
Total Controi Expenses						
Unit Cost						
Overtime						
Total Hours Worked						
Overtime Hours			%			

Comments: Copies to:

Budget allowance is determined by the per cent of operations to capacity, measured by units produced at standard in production departments, and by total related manufacturing output in those staff or service departments where the variable principle can be applied. In staff departments where there is no direct relation between expenses and plant activity, such as engineering and purchasing, no attempt is made to use a variable budget, and the allowance is determined in advance on a monthly basis.

The comparison of actual to budget is highlighted in the "Per Cent (Over) or Under" column. Amounts over budget are shown in red, and amounts under in black. The red figures are a danger signal which the foreman should either explain to his own satisfaction or investigate for immediate correction.

Unit cost shown at the bottom of the performance schedule represents total expenses divided by the units used to measure capacity. This provides an index for comparing cost in different periods and under varying conditions. Any unusual conditions or expense elements reflected in the report are noted under "Comments" to help the foreman interpret his results. The names of supervisors or executives receiving copies of the report are listed to add weight to the figures and as a notice to the foreman.

Results Achieved

Our control program has been in operation for less than a year and is still in its early stages. Installation required many meetings with the plant foremen devoted to selling and instruction, as well as strenuous sessions with the several departments involved in summarizing and recording cost information.

Today, however, the machinery is functioning smoothly to produce control figures each month. The history of expenses is still too brief to yield sufficient data for department budgets, but in the interim expenses are reported to each department regularly. And the tangible results already secured indicate the program will pay handsome dividends.

Reaction of Foremen Favorable

Comments from the shop in general are favorable. Many foremen feel that we are doing them a service in providing data to guide them in their operations. Nearly all of the foremen are very definitely cost conscious. They will haggle about a charge from the maintenance department for which they do not believe they should be held responsible, and they will bring to our attention improvements made which have resulted in a saving. The benefits of this kind of thinking in the shop cannot be overemphasized. Not only does this contribute to more production by reducing lost time and wasted effort, but it tackles the control problem at the

source where the small losses begin to add up to the larger waste buried in total factory overhead.

In effect the foreman has been made a part of the management. He begins to realize that he contributes to the success or failure of the business and that he is the general manager of one department, a co-worker with the executives. Because this is true, and because in the last analysis success or failure in competition may depend on the foreman's ability to maintain efficient operations, this is one of the major contributions of cost control.

Expense reports have already exposed weak spots in the operating departments. Plant management and foremen have gone to work on these with visible results. This has demonstrated clearly the double value of control figures, first to locate trouble and, second, to measure improvements as they are made. Furthermore these initial steps toward cost control are laying a sounder base for the budgets which will follow. It would be a mistake to establish a budget which was in effect padded with unnecessary expenses, and the improvements now being made will help to squeeze the water out of the budget base.

Another important result of the work to date has been to provide management with a complete breakdown of factory overhead in terms of the individuals responsible for spending money. Heretofore expense schedules in the financial statements showed what the money was spent for, but only in general where it was spent. Now we know not only where, but why as well, because of the functional nature of each department. Management can put its finger on the individual responsible for each expenditure. This has significant implications for any period when expenses must be curtailed. At such a time expenses can be reviewed in detail with each department head and necessary cuts evaluated in terms of the functions to be curtailed or eliminated. In this way expenses can be cut, and the least amount of damage done to the combined operations.

Improved Costing

From a cost standpoint, the benefits have been many. Smaller cost centers have developed many instances where the variation of overhead rates within parts of the old cost centers was substantial, and more accurate cost will now be secured. Labor reporting on

daily job cards has vastly improved cost data both in detail and in accuracy. Supply costs and repair costs as now secured are reliable measures of these important overhead expenses. And, of course, the greater detail now available in all these items permits a more accurate spreading of burden to manufacturing operations.

We do not believe that control accounting conflicts with cost accounting. There have been some cases where a choice was necessary between the two objectives of control and good cost, but the sacrifices in either direction have not proved to be of material consequence. The most important single cost factor is that foremen now are watching their expenses closely. While they are concerned chiefly with improving their performance, they are unconsciously making a substantial contribution to the cost department by watching every charge that is made to their departments and giving us accurate reporting from the shop.

The final result has not yet been achieved. This will be to fit the operating controls into a complete financial budget, as the basis for top management control of business operations. When budgets have been established for each of the operating departments these will be combined with a total budget of income, expenses and capital requirements. If anticipated sales will not support the structure the operating budgets will be tailored to fit. Executives can see at the beginning of the year whether expected income will be sufficient to meet operating costs and also provide the funds needed to finance plant expansion and any required increase in working capital. If not, the process of balancing will force a reduction in operating costs, reduce plans for plant improvements and expansion, or otherwise adjust the program until the stage is set for the year's operations. And as the year progresses failure to meet the budget, as shown by variations, will be a signal to the management either that more sales effort is needed or that operations must be further adjusted to meet the new conditions.